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How
to
Make

Import Division

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TREE SEEDS GROW



Price 25 Cents

Otto Katzenstein & Company

TREE SEEDS SPECIALISTS

ATLANTA, GEORGIA, U. S. A.

How To Make Tree Seeds Grow

WE RECEIVE frequent inquiries as to the proper time and the best methods for the sowing of woody plants. The following general directions were compiled with a view of aiding particularly the beginner in making the propagation of woody plants from seed a success. Practical experience will help further. Success should be the rule. Some failures are unavoidable and they may be caused by many reasons beyond the control of even the most experienced planter. They should not unduly discourage the beginner.

People who raise flowers and vegetables from seed with the greatest ease refrain from the production of tree and shrub seedlings because they believe that it requires the overcoming of many difficulties and intricate knowledge, to arrive at success. This is a mistake. Anybody may be successful who is observing and adheres to the laws of nature. It is, however, not advisable for the beginner to enter the field of raising woody seedlings on a too extensive scale. Success comes with knowledge, experience and confidence. The few hints given here are the results of practical experience of many years and it is our hope that they may prove of service.

Beginners, particularly those desiring to grow for the trade, should start with smaller quantities of a larger variety of kinds, find by practical elimination the ones with which they are most successful and for which a market exists or can be created and then specialize in producing them in quantity. The market for well grown woody seedlings is now almost unlimited. Many extensive reforestation projects absorb enormous quantities of seedlings of coniferous and deciduous trees, and since an embargo on foreign grown seedlings has been declared a wonderful market has been opened for the American producer of tree and shrub seedlings. This industry is still in its infancy and it will stand material expansion in the right direction for a considerable period.

WHEN TO ORDER TREE SEEDS.

It is best to prepare a list of needed seeds as early in the season as possible and to place order with a firm of reliable tree seedsmen **BEFORE** the crops are ripe. This will not only assure delivery provided there are crops, but it will bring the seeds to the grower in best condition and will allow for proper preparation for planting. The supply of naturally growing tree seeds is limited in even the best years and often the most desirable kinds are off the market long before the planting season is over.

The seeds of several maples, birches, elms, cottonwoods, etc., must be planted immediately after ripening because they lose their viability very quickly and they cannot be carried in stock, for any length of time.

WHERE TO BUY TREE SEEDS.

The first step after making the selection is to place order with a reliable firm. As the first cost of tree seeds is the smallest item connected with the raising of seedlings, it is important that one avoid the purchase of "cheap" seeds because they are generally the most expensive ones in the end. The seeds should be true to name, fresh and of at least average germinative quality. Dealing with established and reputa-

ble firms gives an assurance of satisfactory service and that is the best guaranty and insurance a careful planter requires.

Much good seed is allowed to go to waste in nurseries and elsewhere which should be gathered by planters. Seeds gathered at and near home may be cared for best and should produce the most satisfactory results. The tree seedsman should be called upon to supply the kinds not available at home.

COST OF SEEDS.

The first cost of seeds is a matter of consideration but the actual value of seeds is not always shown in the price. Seeds with a high germination are worth very much more to the planter than inferior seeds at any price. They require the purchase of smaller quantities, lower cost for delivery, less planting space, less labor for cultivation and the seedlings from high grade seed are generally sturdier.

TESTING OF SEEDS.

The average percentage of germination varies with the different kinds and in different years. Seeds of conifers will often show a germination of 65 to 90% while seeds of deciduous trees frequently have a lower percentage of germination. *Liriodendron*, *Platanus*, *Populus*, etc., hardly ever exceed and not always attain a germination of 10%.

The percentage of germination should be ascertained by tests before the seeds are planted. It generally runs a little higher in tests than the seeds will show in the seedbeds. Such tests obviate future claims. No tree seedsman can guarantee any stand of seedlings in the seedbeds because too many uncontrollable conditions may interfere.

The seeds can be tested easily. The best time is during winter and a sunny room or a greenhouse with fairly even temperature of 70 to 80° F. are most suitable. Seeds are generally tested in units of 100 of a kind, which are taken at random from the parcel to be tested. They may be sown on the surface of shallow boxes in sand or soil, which are kept evenly moist. Or, they may be placed between layers of damp blotters or in one of the germinating devices on the market. A daily record of the seeds showing germination must be kept and these added to the number of sound seeds at the conclusion of a test show percentage of viable seeds.

CONDITION OF SEEDS.

Purchasers should insist on the delivery of fresh seeds. Some kinds of tree seeds are serviceable for several years, such as *Robinia*, *Gleditsia*, *Acacia*, *Maclura*, *Gymnocladus*, etc. Of conifers the soft-shelled pines (*Pinus edulis*, *P. palustris*, etc.) must be fresh but a number of the hard-shelled species (*Pinus banksiana*, *ponderosa*, *sabiniana*, etc.) will retain their viability for two years or even longer.

A very important point is the origin of the seeds. They should come from sections where the different species attain their maturity under as vigorous climatic conditions as the species will permit. Judicious selection of seed is one of the outstanding duties of the tree seedsman and it matters not where he is located himself as long as he gives full consideration to the interests of his customers.

The tree seedsman should use every effort to deliver seeds only which are true to name. He must depend upon many sources for his own supplies, and while he may be exceedingly careful in the selection and training of his collectors it is sometimes impossible to detect errors where seeds of different kinds

resemble each other closely. Such errors should occur very rarely, but for many years now tree seedsmen all over the globe have declined legal responsibility for the trueness to name of the seeds sent out by them.

Garden varieties of trees and shrubs should be propagated from cuttings or by some other method than sowing. Such varieties do not generally reproduce themselves in any given percentage and the tree seedsmen must decline all responsibility that such seeds will come true any given percentage to variety.

PREPARATION OF SEEDS.

While tree seeds are at their best while fresh, most seeds require a period of after-ripening for the development of the embryo. Only a few species, like *Acer dasycarpum*, *Acer rubrum*, etc., drop with fully developed embryo, which accounts for their very short viability. This after-ripening is best attained during a period of varying length and in an even temperature of, generally speaking, 41° F., after which seeds will germinate readily which otherwise would have remained dormant a year and even longer.

Until this process of after-ripening is available to all planters, seeds which will not come up the first year and others, should be stratified. Stratification is the placing of seeds in thin layers between layers of sand. The containers should be protected against attacks from mice and other vermin. Seeds are stratified to keep them from drying out, or because they have very hard shells, or because they do not germinate the first year—such as Junipers, nuts, *Crataegus*, *Viburnum*, *Ilex*, roses, fruit seeds, etc., which may be kept stratified until the second year.

Maceration.—Seeds covered with thick pulp, such as *Magnolia*, *Berberis*, etc., should have these skins removed by soaking in warm water. Macerated seeds should be either stratified or sown at once.

Soaking.—Seeds with very hard shells should be soaked in very hot water (around 120° F.) just before sowing until they show signs of swelling up. They must then be sown before they dry out again. Seeds which lay over a year or longer, will not have germination materially hastened by soaking.

HOW TO SOW.

Small quantities may be sown in shallow boxes or pans with good drainage. These boxes may be stacked during winter in a dry cellar or a cold frame. Cracker, or soap boxes split in three make good seed boxes. Fill them with sandy loam up to about half-inch from top and after sowing press the soil down firmly and mulch.

Larger quantities are sown in seedbeds. Seedbeds should be constructed with every care as they can be used permanently. Select a location sheltered from heavy east and northeast winds, and provide for windbreaks in the form of hedges, plantings, fences, etc., where natural protection is missing. A well-drained sandy loam is the best soil. Naturally heavy soils should have sand added to them and too sandy soils are improved by mixing some loam with them. The soil should be worked to a depth of at least twelve inches, should be free from stones and weeds and it should be brought to as fine a mechanical condition as is humanly possible, by repeated raking or harrowing. The earlier the preparation of a seedbed is begun the better results may be expected. Green manuring is very beneficial. Well-

rotted cow manure or compost can be used but fresh manure and particularly stable manure should be avoided.

If the seedbeds can be kept under a hoe crop for a season it will help to destroy weeds which might give much trouble later on.

The length of a seedbed depends upon the local conditions. The width may range from 3½ to 5 feet. Beds wider than 5 feet are handled under difficulties only. The beds may be crowned very slightly to assist in drainage and in heavier soils they may be elevated a few inches above the dividing paths.

WHEN TO SOW.

Different kinds of seeds must be treated differently. In a general way fresh seeds will produce the best results. The list at the end of this booklet may serve as a guide for the best treatment of the different seeds.

HOW TO SOW.

Sowing may be made in drills or broadcast. Both methods have their advantages and disadvantages. Much depends upon local conditions. Seeds of conifers are quite frequently sown broadcast and particularly small quantities are generally sown across the bed. Seeds of deciduous trees and shrubs are more often sown in drills which run lengthwise the beds. No hard and fast rule can be stated covering sowing in drills or broadcast. The depth of sowing depends upon the size of the seeds. Many good seeds are needlessly sacrificed by improper handling. Fundamentally it is better to err by sowing too shallow rather than too deep. It is about correct to cover the seeds about their own thickness. Seeds of conifers require very light covering. Seeds of nuts, acorns, honeylocusts, Kentucky Coffeetree and some others come up best from a depth of 2 or 3 inches.

When sown in drills allow for a distance of 4 to 5 inches between the rows for slow-growing plants, like conifers, and 9 to 12 inches for fast-growing kinds. Where cultivation by power is preferred the distance between the drills should be 40 inches and the field is then not laid off in beds. Before sowing smooth and firm the soil. For an experienced planter the sowing by hand is the best method as the seeds can then be distributed evenly. It may also be done with the aid of mechanical devices or with a seeding machine. There are a good many practical devices in use, such as seeding troughs, etc. Very fine seed may be mixed with sand or earth to give it more consistency. It is not advisable to use sawdust because it may rot and ferment in the ground and cause formation of pernicious fungi. Do not sow too thickly. Seeds, particularly of conifers, should not touch each other or the danger of damping-off will be multiplied. After sowing the soil should be firmed again with a board, or the back of a spade or a very light roller.

A light mulch will be found very beneficial. Chopped moss, lawngrass refuse, pine needles, thoroughly rotted and pulverized cow manure, such as mushroom manure, where obtainable, make satisfactory mulches. Coverings of parchment paper also have given good results. Sawdust is not advised for reasons already stated. The mulch must be removed gradually as the seedlings appear. The beds, particularly of conifers, should be kept shaded during the first summer. This is not so important for beds containing acorns or nuts.

Handy screens are prepared by the use of building laths, by nailing burlaps on frames or by rolling

canvas over the beds on elevated frames. Screens are generally placed 18 inches above the beds and raised gradually as the seedlings become accustomed to the sunlight until they are finally removed. Intensive growers sometimes erect permanent lath-houses with the roof about 7 feet above the beds.

Watering.—If the sowings are made while the soil is in good condition and if the beds are kept mulched and shaded but little watering will be found necessary under normal weather conditions. When unavoidable water early in the morning or late in the evening but unless a very fine spray is used the beds may be harmed more than benefited. The installation of one of the automatic sprinkling systems will be found a great aid.

DAMPING-OFF.

This dreaded enemy of the grower which has caused endless heartbreaks can be controlled now quite largely through the use of one of the modern mercury preparations, like Uspulun, Dipdust, Semesan. These preparations may either be applied to the seedbed in dry form (Dipdust) or wet when the seedlings appear (Uspulun, Semesan) and their judicious use will prevent damping-off almost entirely. The cost is only nominal, particularly where the saving of seedlings is taken into consideration, and not only seedlings but also cuttings can be treated. While definite formulas have been worked out for the use of these preparations each grower should experiment somewhat for himself.

CULTIVATION.

After the seedlings are up the beds should be cultivated carefully but very lightly so as not to disturb the growth of the seedlings. Careful shading is of particular importance at this stage. The seedlings of conifers should be transplanted as soon as the first leaves appear and this should be repeated rather frequently to encourage root growth. Seedlings of deciduous plants are transplanted into nursery rows the next planting season, when they should have attained sufficient growth.

SOWING UNDER GLASS.

Very fine seeds, such as, for instance, seeds of the heather family to which belong the Azaleas, Andromedas, Pieris, Rhododendron, etc., are best sown under glass in pans filled with finely sifted peat. The pans should have thorough drainage and should be watered before the seed is sown. The seed is barely covered with soil and is mulched with a thin layer of finely chopped sphagnum moss. Watering is done with a very fine spray and the soil should never become quite dry. The pans are covered with glass bulbs or paper. When germination begins remove the mulch and begin transplanting as the first leaves appear. Transplant the seedlings as often as possible and harden them quickly so that they may be moved into beds in the open in the spring of their second season.

PALM SEEDS.

In a general way palms are sown with bottom heat of about 80° F. Kinds coming from low wet places should be sown in rough soil and the containers should be placed in water. The temperature and moisture should be kept even at all times. The seedlings should be transplanted early and frequently and great care should be taken to avoid the breaking of the roots.

HERBACEOUS PLANTS.

Unless sown in large quantities they are best sown in boxes (flats) as described before. Fall sowings are best and conducive to production of flowering plants for the coming season. The seedlings should be pricked out into other boxes or be planted out at once. Seeds with very hard shells are best soaked before sowing but they may lay over then for a whole year. Treatment of the seeds and beds with mercury preparations is very advisable.

A LIST SHOWING THE BEST TIME AND METHOD OF SOWING.

- A—Sow promptly after ripening.
 B—Stratify and sow in spring.
 C—Stratify and sow second season.
 D—Sow in fall or stratify.
 E—Sow in early spring.
 F—Sow after ground is well warmed up in spring.
 G—Soak in hot water immediately before sowing until seeds show signs of swelling.
 H—Macerate (wash off pulp) and sow at once or stratify for spring sowing.
 I—Best sown under glass or with bottom heat.
 K—Sow on peat or live moss.

Example: DE—Sow after ripening in fall or stratify and sow in spring.

("1" means seeds should be sown about one inch deep, etc.)

Abies	E	Ceanothus	E
Acacia.....	A or GF or I	Cedrela	F or I
Acer.....	(1) A or DE	Cedrus	E
Aesculus.....	A or B	Celastrus	B
Ailanthus	A or B	Celtis	A or B
Akebia	F	Cephalanthus	E
Albizzia.....	A or GF or I	Cephalotaxus	E
Aleurites	D	Ceratonia	FG or I
Alnus	E	Cercidiphyllum	F
Amelanchier	A or DE	Cercis	GE
Ampelopsis	HE	Chamaecyparis	E
Amygdalus	F	Cherry	B
Andromeda	EK	Chionanthus	B
Apple	B	Cinchona	I
Apricot	B	Cinnamomum	B
Aralia	E	Citrus	HGE
Araucaria	F or I	Cladrastis	E
Arbutus	A or B	Clematis	B
Arctostaphylos	A or B	Clethra	E
Ardisia	F or I	Colutea	GE
Aristolochia	E	Cordyline	I
Aronia	H	Coronilla	EG
Asimina	DG	Cornus	A or B
Aucuba	A or BF	Corylus	A or B
Avocado	AI	Cotoneaster	H or C
Azalea	F or I	Crataegus	H or C
Baccharis	F	Cryptomeria	E
Bauhinia	I	Cunninghamia	E
Benzoin	HE	Cupressus	E
Berberis	HE	Cydonia	AH
Betula	A or B	Cytisus	GE
Bignonia	F	Dalbergia	GE
Brousonetia.....	D or BI	Daphne	B
Buddleia	E	Diospyros	A or E
Buxus	BG	Dirca	E
Callicarpa	B	Dracaena	I
Calycanthus	E	Elaeagnus	C
Camellia	GF or I	Erica	FK
Camphora	B	Eriobotrya	BI
Caragana	GE	Eucalyptus	E or I
Carpinus	A or B	Euonymus	B
Carya	A or B (3)	Exochorda	E
Castanea	B	Fagus	A or B
Castanopsis	B	Fatsia	F or I
Catalpa	E	Fothergilla	E

TIME AND METHOD OF SOWING—Continued

Fraxinus	A or C	Pieris	KE
Fremontia	F or I	Pinus	E
Garrya	F	Pistacea	BE
Gaultheria	B	Pittosporum	EI
Ginkgo	H	Platanus	BE
Gleditsia	EG (1)	Plum	B
Gordonia	E	Podocarpus	E
Grapes	H	Poinciana	F or I
Grevillea	I	Populus	A
Gymnocladus	GE	Prosopis	F
Halesia	C	Prunus	B
Hamamelis	A or C	Pseudolarix	E
Hedera	A or C	Pseudotsuga	E
Hesperoyucca	F	Ptelea	A or B
Heteromeles	E	Pterocarya	E
Hibiscus, hardy	E	Pueraria	GF
Hibiscus, tender	I	Pyracantha	H or C
Hicoria	(3) A or B	Pyrus	B
Hippophae	A or B	Quercus	(2) A
Hovenia	E	Rhamnus	A or B
Hydrangea	E	Rhododendron	EK
Hypericum	E	Rhodotypos	E
Ilex	H or C	Rhus	A or B
Illicium	F or I	Ribes	A or B
Itea	E	Robinia	GE
Juglans	A or B (3)	Romneya	CF
Juniperus	HC	Rosa	HCE
Kalmia	EK	Rubus	A or C
Kerria	BE	Salisburia	HB
Koeulreuteria	D	Salix	AK
Laburnum	DE	Sambucus	A or C
Lagerstroemia	B	Sapium	F
Larix	E	Sassafras	A or E
Laurocerasus	BF	Sciadopitys	E
Laurus	BF	Schinus	A or F
Leucothoe	KF	Sequoia	E
Libocedrus	E	Shepherdia	H
Ligustrum	A or B	Skimmia	BI
Lindera	HE	Smilax	HE
Liquidambar	A or C	Sophora	GE
Liriodendron	B or E	Sorbus	H
Lonicera	HE	Spartium	GE
Maclura	E	Spathodea	IK
Magnolia	HB	Spiraea	A or B
Mahonia	HE	Staphylaea	A or B
Melia	E	Sterculia	E
Menispermum	B	Stewartia	A or B
Meratia	E	Stillingia	F
Mohrodendron	C	Styrax	A or C
Morus	A or E	Swietenia	I
Myrica	H	Symphoricarpus	A or B
Myrtus	F or I	Syringa	B
Nandina	H	Taxodium	A or B
Negundo	A or E	Taxus	HC
Nyssa	A or C	Tecoma	E
Olea	HG	Thea	F or I
Oranges	HGE	Thuja	A or B
Opuntia	E	Tilia	A or C
Ostrya	A or B	Torreya	E
Oxydendrum	EK	Tsuga	E
Palms	I	Ulmus	A
Paulownia	E	Vaccinium	HE
Pear	B	Viburnum	A or C
Pecan	A or B (3)	Virgilea	E
Persea	B	Vitex	E
Persica (Peach)	B	Vitis	H
Phellodendron	F	Wisteria	E
Philadelphus	E	Yucca	E
Phillyrea	A or BF	Zelkova	E
Photinia	E	Zizyphus	F
Picea	E		